

NON-PUBLIC?: N  
ACCESSION #: 8905100159  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Virgil C. Summer Nuclear Station PAGE: 1 of 4

DOCKET NUMBER: 05000395

TITLE: Reactor Trip on Lo-Lo Steam Generator Level Following Turbine Trip

EVENT DATE: 04/01/89 LER #: 89-006-00 REPORT DATE: 05/01/89

OPERATING MODE: 1 POWER LEVEL: 030

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: W.R. Higgins, Supervisor, Regulatory  
Compliance TELEPHONE: (803)345-4042

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE TO NPRDS: No

SUPPLEMENTAL REPORT EXPECTED: No

#### ABSTRACT:

On April 1, 1989 at 0447 hours with the plant operating at approximately 30% power, a turbine-trip occurred as a result of high moisture separator reheater level. Feedwater temperature dropped below the feedwater isolation setpoint on all three steam generators due to the loss of feedwater heating resulting from the turbine trip. Approximately 30 minutes after the turbine trip, with actual feedwater flow as expected for 30% power, indicated flow to "C" steam generator began drifting down. When the transmitter indicated feedwater flow was below the isolation setpoint, the "C" feedwater isolation valve closed on low flow coincident with low temperature signals. Steam generator water level began decreasing and approximately two minutes later the reactor tripped on lo-lo level in steam generator "C."

A similar turbine trip, without a reactor trip, had occurred on March 30, 1989 at 1819 hours. The initial review of system indications, alarms and plant responses for that trip indicated the trip was the result of several erroneous instrumentation signals and not the result of actual moisture separator

reheater (MSR) high level conditions. Subsequent to the April 1 reactor trip, several improperly functioning MSR and MSR drain tank level switches, alarms and controllers were discovered and repaired. These malfunctions were responsible for the conflicts seen between actual plant conditions and indicated data during each turbine trip. Also, air was found in the "C" feedwater flow transmitter which caused the indicated low flow condition.

As a result of the events described above, post turbine trip without a reactor trip reviews are being proceduralized to ensure detailed investigations are initiated for secondary plant trips.

END OF ABSTRACT

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PLANT IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

EQUIPMENT IDENTIFICATION:

Feedwater System -EIIS - SJ

Steam Generator Water Level Control- EIIS - JB

Moisture Separator Reheater - EIIS - SB

IDENTIFICATION OF EVENT:

Reactor trip on lo-lo steam generator level following turbine trip.

EVENT DATE:

April 1, 1989 at 0447 hours.

REPORT DATE: May 1, 1989

This report was initiated by Off-Normal Occurrence Number 89-033.

CONDITION PRIOR TO EVENT:

Plant startup and low power operation in progress - secondary chemistry cleanup underway.

DESCRIPTION OF EVENT:

On March 30, 1989, a turbine trip occurred. The unit had been placed on line

at 1732 hours on March 30, and at 1819 hours, the turbine tripped. Operations personnel stabilized the reactor and then reduced power to approximately 2%. Initial investigations indicated the turbine trip was generated by a Moisture Separator Reheater (MSR) high level signal, but no MSR high level alarms had annunciated. As a result of conflicting indications and plant data, the trip was determined to be the result of erroneously generated signals. Adjustments were made to suspect MSR level switches and the generator was placed back on line at 1047 hours on March 31.

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While operating at 30% power at approximately 0430 hours on April 1, 1989, operators in the Control room received a MOisture Separator Reheater Drain Tank (MSRDT) high level alarm. Control board indications implied the level control valve was modulating in order to control level. Several minutes later, at approximately 0447 hours, the MSR high level alarm came in, accompanied by a turbine trip. Appropriate procedures were utilized to stabilize the plant at approximately 30% power using the steam dumps to the condenser.

After the turbine trip, feedwater temperature began to drop due to the loss of extraction steam normally used for feedwater heating. The feedwater temperature dropped below the isolation setpoint on all three steam generators; however, actual feedwater flow remained stable and high enough to prevent the feedwater isolation valves from closing. Shortly after the turbine trip, indicated feedwater flow for "C" steam generator began drifting down. Approximately 30 minutes after the turbine trip, the "C" steam generator flow transmitter indicated feedwater flow was below the isolation setpoint and the "C" isolation valve shut on the low temperature coincident with low flow. Steam generator water level began decreasing and approximately two minutes later, the reactor tripped on lo lo level in steam generator "C."

#### CAUSE OF EVENT:

The cause of this event was various secondary equipment malfunctions. Subsequent to the reactor trip, detailed investigations revealed instrument and equipment malfunctions including MSR and MSR drain tank alarms, level switches, level controllers, and valve positioners.

The turbine trip was caused by actual high MSR level resulting from:

- 1) malfunction of MSR drain tank level controller (loss of modulating control);
- 2) malfunction of MSR drain tank level switch;

3) system alignment to bypass number 2 feedwater heaters.

The subsequent reactor trip on low feedwater temperature coincident with low feedwater flow resulted from an indicated, but not actual, low flow signal. This signal was generated by a flow transmitter which was offset low due to air in the transmitter.

#### ANALYSIS OF EVENT:

This report is being submitted pursuant to the requirements of 10CFR50.73(2)(a)(iv). Notification to the NRC Operations Center via the Emergency Notification System was made at 0634 hours on April 1, 1989 pursuant to the requirements of 10CFR50.72(b)(2)(ii).

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The plant responded as expected to the reactor trip for the operating conditions existing at the time of the event. The reactor coolant system experienced a cooldown due to the small amount of decay heat, the addition of cold emergency feedwater flow from the condensate storage tank to the steam generator, and the normal steam loads to the generator and turbine seals. Pressurizer level decreased to approximately 10% and pressurizer pressure decreased to approximately 2020 psig. Reactor Coolant System temperature decreased to 512 degrees F. Approximately 8 minutes after the reactor trip, the Main Steam Isolation Valves were closed to halt the cooldown. Subsequently, pressurizer pressure and level recovered along with steam generator level. The cooldown was terminated approximately 17 minutes after the reactor trip and RCS temperature began to recover.

#### IMMEDIATE CORRECTIVE ACTION:

1. Implemented EOP's 1.0 and 1.1, Reactor Trip and Reactor Trip Recovery procedures.
2. Repaired/replaced/recalibrated improperly functioning MSR drain tank and MSR level switches, controllers and valves.

#### ADDITIONAL CORRECTIVE ACTION:

A Management Review Board (MRB), chaired by the Vice President, Nuclear Operations, was convened on April 2, 1989 to review the details surrounding this event. The following corrective actions were identified to help improve the South Carolina Electric & Gas Company (SCE&G) overall ability to evaluate and analyze plant transients resulting from secondary plant trips, and subsequently prevent unnecessary reactor trips.

1. A review of the preventative maintenance (PM) program for the MSR and heater level controllers and trip switches was performed to verify that adequate PM's existed. A revision to Station Administrative Procedure - 143 has been initiated to strengthen the classification and evaluation process for PM's not performed.

2. Add post trip review requirements to applicable procedures to initiate reviews for secondary plant trips.

Expected completion date: December 1, 1989

**PRIOR OCCURRENCES:**

None.

ATTACHMENT 1 TO 8905100159 PAGE 1 OF 1

South Carolina Electric & Gas Company Ollie S. Bradham  
P.O. Box 88 Vice President  
Jenkinsville, SC 29065 Nuclear Operations  
SCE&G (803)  
45-4040

May 1, 1989

Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

SUBJECT: Virgil C. Summer Nuclear Station  
Docket No. 50/395  
Operating License No. NPF-12  
LER 89-006

Gentlemen:

Attached is Licensee Event Report No. 89-006 for the Virgil C. Summer Nuclear Station. This report is submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv).

Should there be any questions, please call us at your convenience.

Very truly yours,

O. S. Bradham

AMM/OSB:lcd  
Attachment

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